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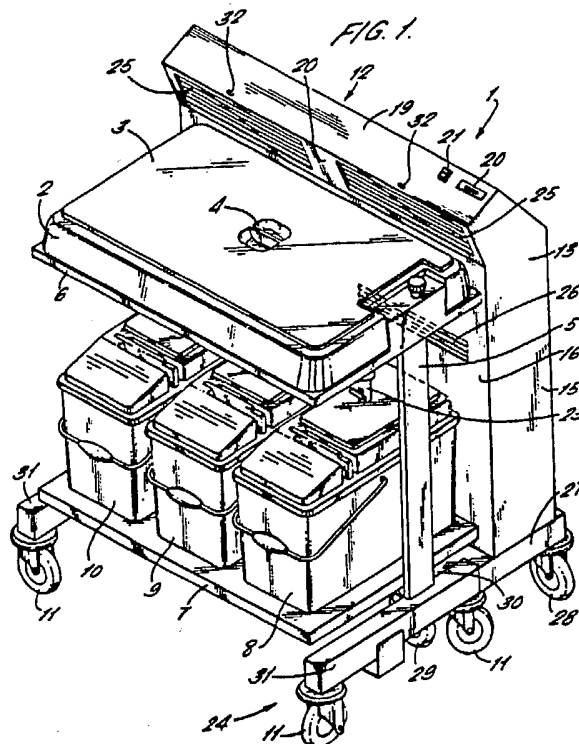
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**GB 2028658 A GB 1500862 A GB 0871503 A**  
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(58) Field of search  
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**INT CL<sup>6</sup> A61L 2/16 2/18 2/20**

(54) **Disinfecting apparatus for medical instruments**

(57) Disinfecting apparatus comprises a tray (2) for receiving a medical instrument and for receiving in use disinfectant solution to disinfect the instrument. A removable closure (3) fits onto the tray and encloses a space above the tray to substantially prevent escape of disinfectant vapour in use. A filtration unit (12) is operable to remove disinfectant vapour from the air and has inlets (25) and fans (37 see figure 2) operable to draw air into the inlets, the inlets being located adjacent the tray such that air enclosed by the closure in the space above the tray is drawn into the inlets when the closure is fully or partially removed. The apparatus is useful in hospitals to minimise the release of disinfectant vapours into the atmosphere.



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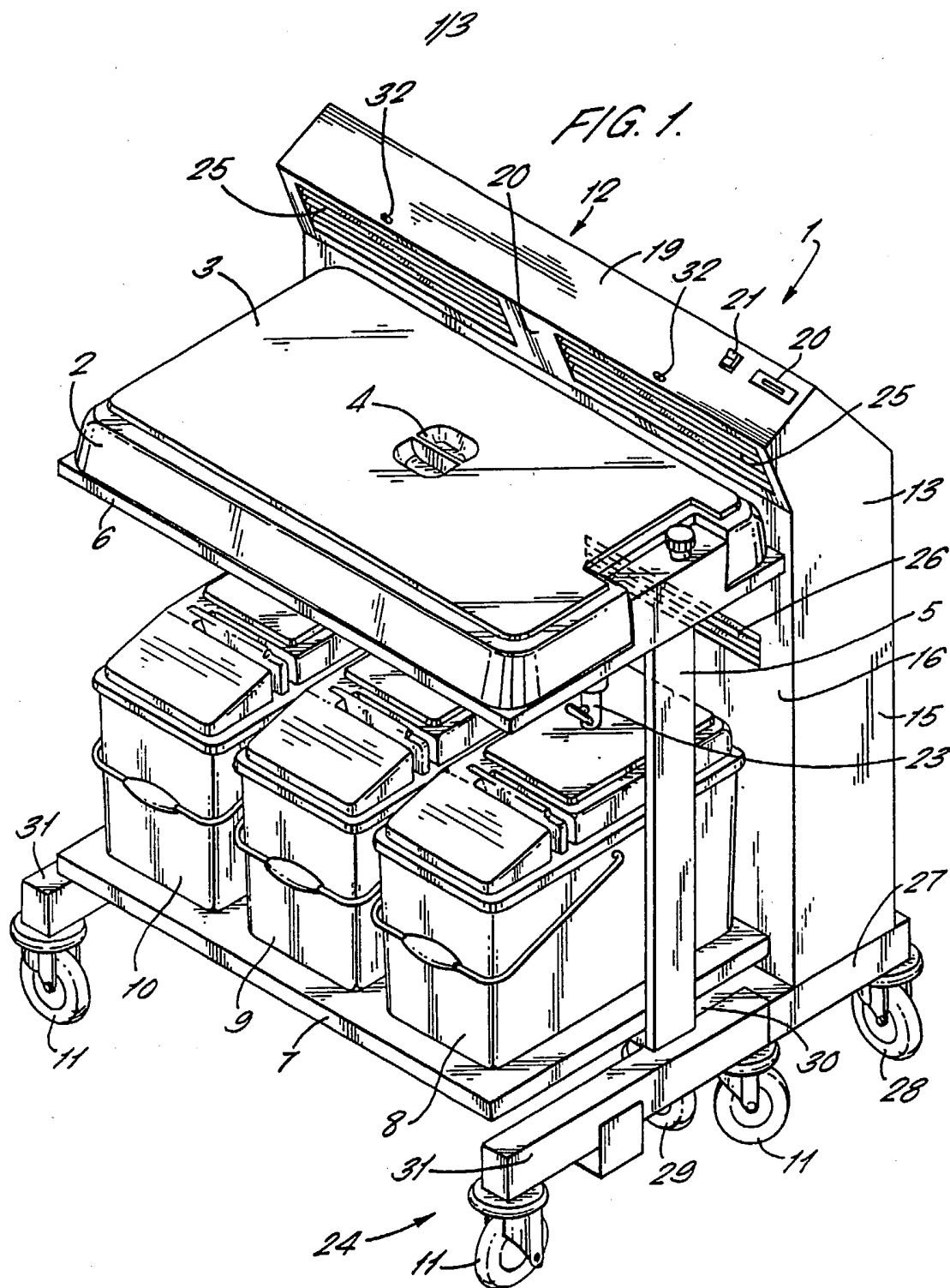


FIG. 2.

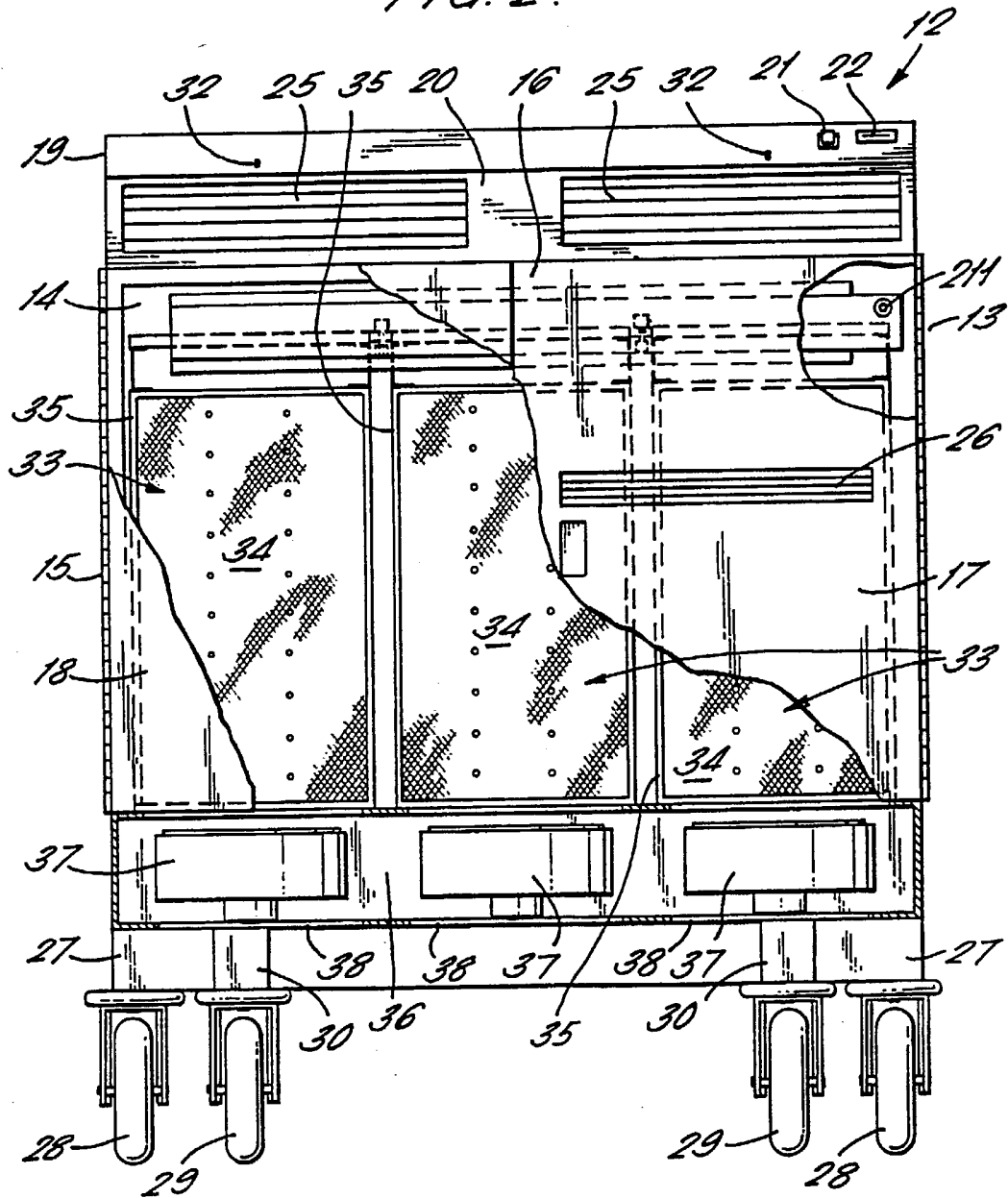
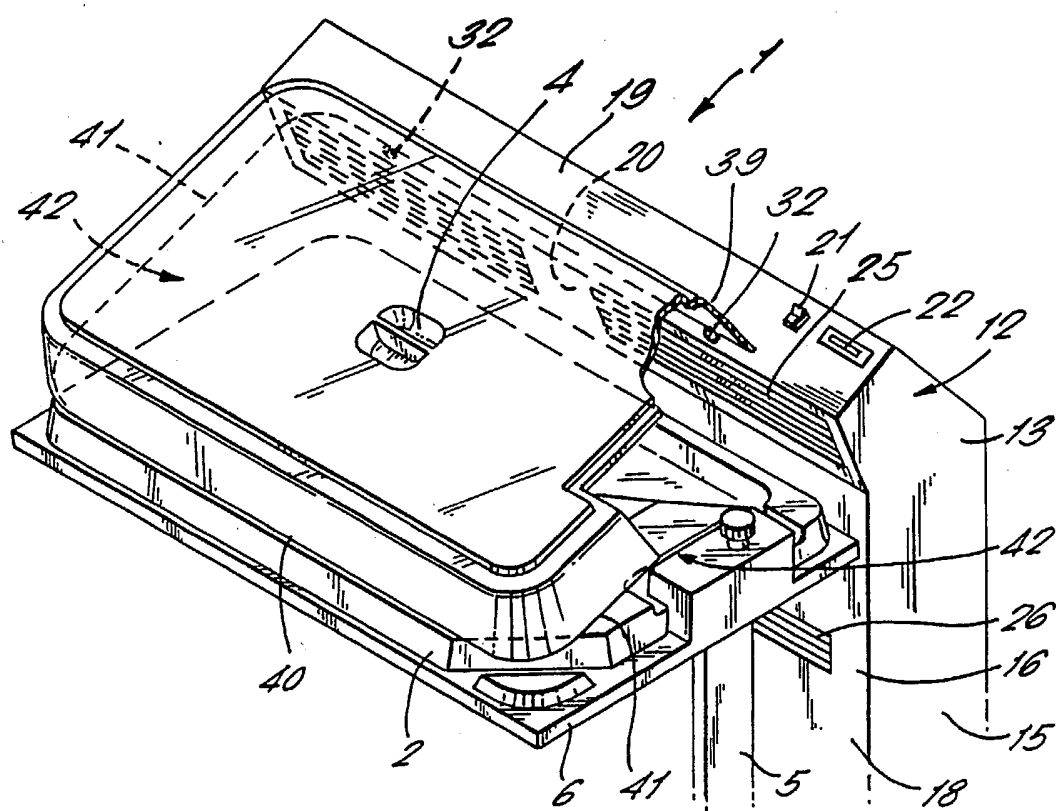


FIG. 3.



DISINFECTING APPARATUS FOR MEDICAL INSTRUMENTS

This invention relates to disinfecting apparatus for medical instruments and in particular  
5 but not exclusively to disinfecting apparatus for endoscopes.

It is known for medical instruments such as endoscopes used in proctology and gastrology to be cleaned and disinfected prior to re-use in a  
10 specialised disinfecting apparatus. The disinfecting process typically includes a washing cycle during which the endoscope is flushed with detergent, a disinfecting cycle during which the endoscope is flushed and allowed to soak in disinfectant followed  
15 by a rinsing cycle during which rinsing water removes traces of disinfectant and finally an air cycle during which air is blown through the endoscope to dry the channels.

A problem with such disinfecting processes is  
20 that fumes from the disinfecting solution can build up to an unacceptable concentration in the atmosphere thereby presenting a health hazard to the user.

In accordance with the present invention there is disclosed disinfecting apparatus comprising a tray  
25 for receiving a medical instrument and for receiving in use disinfectant solution to disinfect the instrument, a removable closure fitting onto the tray and enclosing a space above the tray to substantially prevent escape of disinfectant vapour in use, a  
30 filtration unit operable to remove disinfectant vapour from the air and having one or more inlet and fan means operable to draw air into the inlets, one or more of the inlets being located adjacent the tray such that air enclosed by the closure in the space  
35 above the tray is drawn into the one or more inlets when the closure is fully or partially removed.

Disinfectant vapour which would otherwise be released to the atmosphere when the closure was removed can therefore be drawn into the filtration unit and removed from the air before being returned  
5 to the atmosphere.

Preferably the apparatus includes means supporting the closure in a partially removed position in which one or more of the inlets is located between an edge of the closure and the tray.

10 The partially removed closure can be held in this position until all traces of disinfectant have been removed from the space between the tray and the closure. Air drawn into the inlets of the filtration unit is replaced by an inflow of air which may assist  
15 drying of the tray and closure.

Preferably the raised edge of the closure is supportable by means of studs projecting by the filtration unit.

Conveniently the tray is provided with a drain  
20 cock and the filtration unit includes a further inlet adjacent the drain cock.

Any vapour given off by the disinfectant during draining can therefore be drawn into the filtration unit and removed from the air before being  
25 recirculated to the atmosphere.

The apparatus may be provided with a disinfectant container and the filtration unit may include a further inlet adjacent the disinfectant container. Any vapour escaping the container or  
30 released when filling or discharging can therefore be drawn into the filtration unit and removed from the air.

Conveniently the tray is supported on a support stand and the filtration unit includes means  
35 removably connecting the filtration unit to the support stand.

A filtration unit may thereby be used with any number of different support stands which may for example carry trays suitable for different types of medical instruments.

5       An embodiment of the present invention will now be described by way of example only with reference to the accompanying drawings of which:

Figure 1 is a perspective view of disinfecting apparatus;

10       Figure 2 is a front view of a filtration unit of the disinfecting apparatus of Figure 1; and

Figure 3 is a perspective view of part of the disinfecting apparatus of Figure 1 showing a tray for receiving a medical instrument and having an openable  
15       closure which is in a partly opened position.

The disinfecting apparatus 1 of Figure 1 comprises a tray 2 for receiving a medical instrument (not shown). The tray 2 is overlaid by a closure 3 in the form of a lid which rests on the tray and is  
20       removable by means of a handle 4.

The tray 2 is supported on a support stand 5 so as to lie horizontally on an upper shelf 6 of the support stand. The support stand 5 has a lower shelf 7 upon which are located a disinfectant container 8,  
25       a detergent container 9 and a water container 10.

The support stand 5 is movably mounted on castors 11.

A filtration unit 12 comprises a sheet metal housing 13 defining a chamber 14 as shown in Figure  
30       2. The housing 13 comprises an upright rectangular cabinet 15 having a front panel 16 comprising left and right hinged doors 17 and 18 respectively. The housing 13 further includes a top portion 19 having a forward sloping front face 20. A control switch 21  
35       is mounted on the top portion 19 together with a display panel 22 and a reset button 211 is mounted

inside the housing.

The tray 2 is provided with a downwardly projecting drain cock 23 which projects beneath the upper shelf 6 adjacent to the right hand end 24 of the support stand 5.

Horizontally extending upper vents 25 are provided in the front face 20 and horizontally extending lower vents 26 are provided in the front panel 16 adjacent to the drain cock 23.

The housing 13 is mounted on a chassis 27 having a pair of rear castors 28 and front castors 29. The front castors 29 are mounted on a forward projecting portion 30 of the chassis 27. The castors 11 of the support stand 5 are similarly mounted on parallel horizontally extending chassis members 31 and the forward projecting portion 30 is dimensioned so as to locate as a snug fit between the chassis members 31 so that the filtration unit 12 is accurately locatable relative to the support stand 5 in a predetermined position.

The housing 13 is provided with upwardly projecting studs 32 which are located on the top portion 19 above the vents 25.

As seen in Figure 2 the cabinet 15 contains three filter units 33 each comprising sheets 34 of activated charcoal received in respective filter housings 35 communicating with an outlet duct 36 located at the bottom of the chamber 14. Three electrically driven fans 37 are located in the outlet duct and arranged to draw air through the filter units 33 so as to expel the air downwardly through outlets 38.

In use a medical endoscope (not shown) is placed in the tray 2 and is connected to the outlet of a pump arranged to circulate liquid from the tray 2 through the operating channels of the endoscope. A



quantity of detergent solution is transferred from the detergent container 9 into the tray 2 and the pump operated to flush the endoscope and generally clean the interior and exterior surfaces of the endoscope. This process is continued until the  
5 endoscope appears clean and the detergent is then drained from the tray 2.

A quantity of disinfectant solution is transferred to the tray 2 from the disinfectant  
10 container 8 and the closure 3 is placed over the tray so as to minimise the emission of disinfectant vapour from the disinfectant solution within the tray. The filtration unit 12 is turned on during this transfer and subsequently continues to operate during which  
15 time the cumulative duration of operation is monitored by a timer which displays the elapsed time of operation in the display panel 22.

The pump is operated to circulate detergent through the endoscope channels and the endoscope is  
20 allowed to soak in the disinfectant solution for a period appropriate to the strength of solution. Typically the disinfectant solution is glutaraldehyde used in 2% aqueous alkaline solution. Any disinfectant vapour escaping from the closure 3 is  
25 entrained in the air drawn into the filter housing 35 through the upper vents 25.

After an adequate period for the disinfectant process to be complete the pump is deactuated and the disinfectant drained from the tank 2 through the  
30 drain cock 23. During this draining procedure any disinfectant vapour given off by the drained disinfectant is entrained in the air flow drawn into the lower vent 26 of the filter housing 35.

The same vent 26 draws any disinfectant vapour  
35 into the filter housing 35 when the disinfectant container 8 is being filled.

The closure 3 is lifted using the handle 4 into the position shown in Figure 3 in which a rear edge 39 of the closure rests on the top portion 19 of the housing 13 and is supported in position by the studs 32. In this position a front edge 40 of the closure 3 remains in contact with the tray 2 and side edges 41 are inclined relative to the tray such that side openings 42 are defined between the tray and the closure. The intake of air through the upper vents 25 results in ambient air being drawn into the space between the closure 3 and the tray 2 through the side openings 42 and residual disinfectant vapour in the space between the tray and the closure is entrained in the air flow and extracted into the filtration unit 12.

After a suitable period of time has elapsed the tray 2 is filled with water from the water container 10 and the closure 3 replaced fully onto the tray 2. The pump is again operated to flush any residual traces of disinfectant from the endoscope and tray 2. The water is then drained from the tray through the drain cock 23 and the endoscope removed for re-use. Finally the endoscope is allowed to dry during an air cycle in which air is passed through the channels of the endoscope.

After a number of cycles of operation it will be necessary to renew the sheets 34 of activated charcoal, the number of hours elapsed since renewal being indicated by the display panel 22. As shown in Figure 2 the sheets 34 are mounted on detachable filter units 33 which are readily removable from the cabinet 15 and can be re-fitted with new sheets ready for replacement of the filter units in the chamber 14.

On renewing the sheets 34 the displayed number of hours is reset using the reset switch 211.

The support stand 5 may if necessary be

detached from the filtration unit 12 by pulling the support stand in a direction parallel to the chassis members 31. Releasable couplings may be provided for locking the support stand 5 to the filtration unit 12.

5           The tray 2 may be provided with means for automatically drawing detergent, disinfectant and water from the respective containers 8, 9, 10 and for automatically draining these liquids after use. Such an arrangement has the advantage that it is not  
10       necessary to lift the lid 3 in order to fill the tray. The sequence of use described above with reference to the preferred embodiment of Figures 1 to 3 is modified when using such an automated apparatus  
15       in that it is only necessary to lift the closure 3 into the half open position described with reference to Figure 3 when the air cycle is completed.

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CLAIMS:

1. Disinfecting apparatus comprising a tray  
for receiving a medical instrument and for receiving  
5 in use disinfectant solution to disinfect the  
instrument, a removable closure fitting onto the tray  
and enclosing a space above the tray to substantially  
prevent escape of disinfectant vapour in use, a  
filtration unit operable to remove disinfectant  
10 vapour from the air and having one or more inlets and  
fan means operable to draw air into the inlets, one  
or more of the inlets being located adjacent the tray  
such that air enclosed by the closure in the space  
above the tray is drawn into the one or more inlets  
15 when the closure is fully or partially removed.

2. Disinfecting apparatus as claimed in Claim  
1 including means supporting the closure in a  
partially removed position in which one or more of  
20 the inlets is located between a raised edge of the  
closure and the tray.

3. Disinfecting apparatus as claimed in Claim  
2 wherein the raised edge of the closure is  
25 supportable by means of studs projecting from the  
filtration unit.

4. Disinfecting apparatus as claimed in any  
preceding claim wherein the tray is provided with a  
30 drain cock and the filtration unit includes a further  
inlet adjacent the drain cock.

5. Disinfecting apparatus as claimed in any of  
claims 1 to 3 comprising a disinfectant container and  
35 wherein the filtration unit includes a further inlet  
adjacent the disinfectant container.

6. Disinfecting apparatus as claimed in any preceding claim wherein the tray is supported on a support stand and the filtration unit includes means removably connecting the filtration unit to the support stand.

7. Disinfecting apparatus as claimed in any preceding claim wherein the filtration unit comprises a housing defining a chamber, the one or more inlets communicating with the chamber, filter means disposed between the chamber and an outlet and wherein the fan means is arranged to draw air from the chamber through the filter means to be expelled from the outlet.

8. Disinfecting apparatus substantially as hereinbefore described with reference to and as shown in the accompanying drawings.